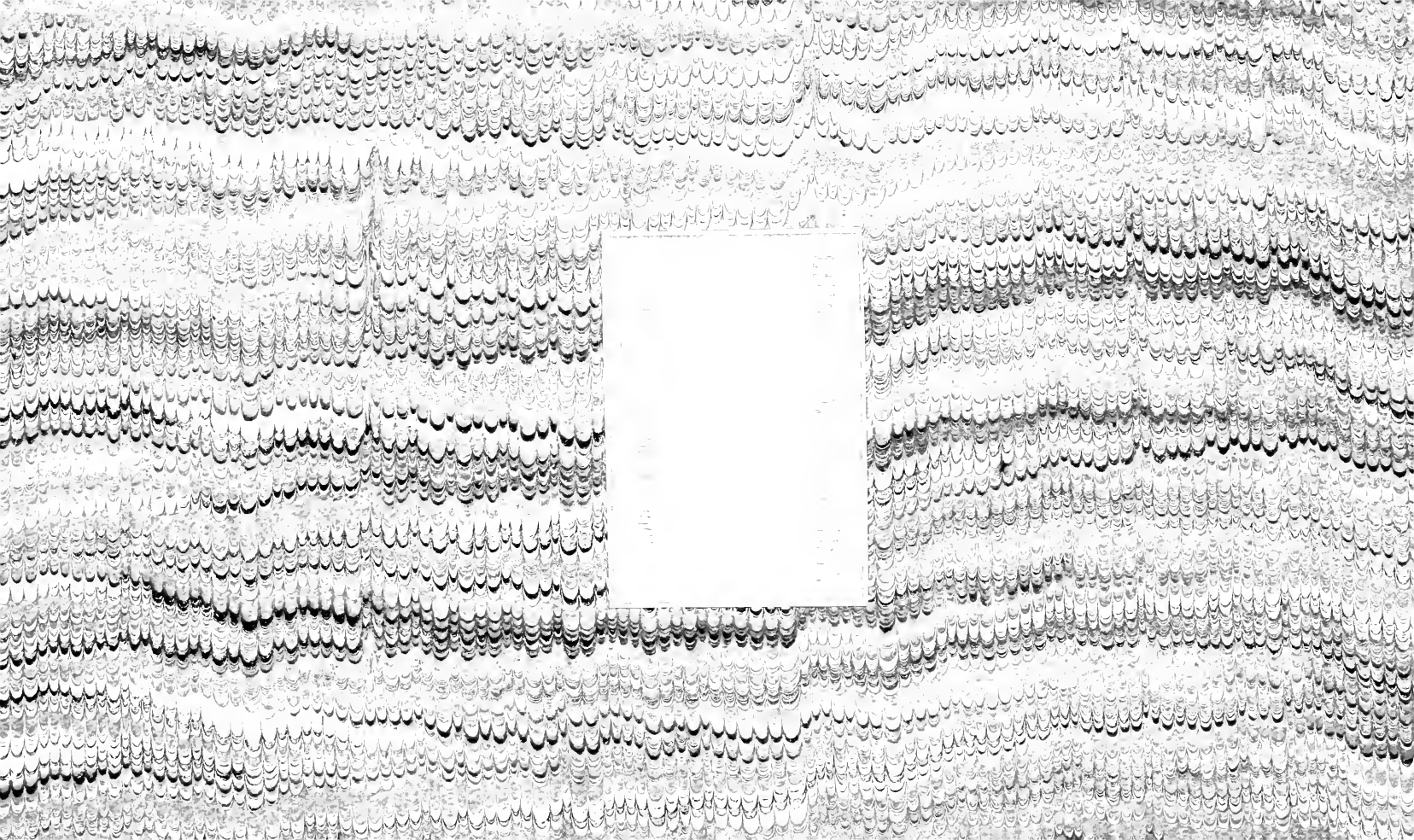

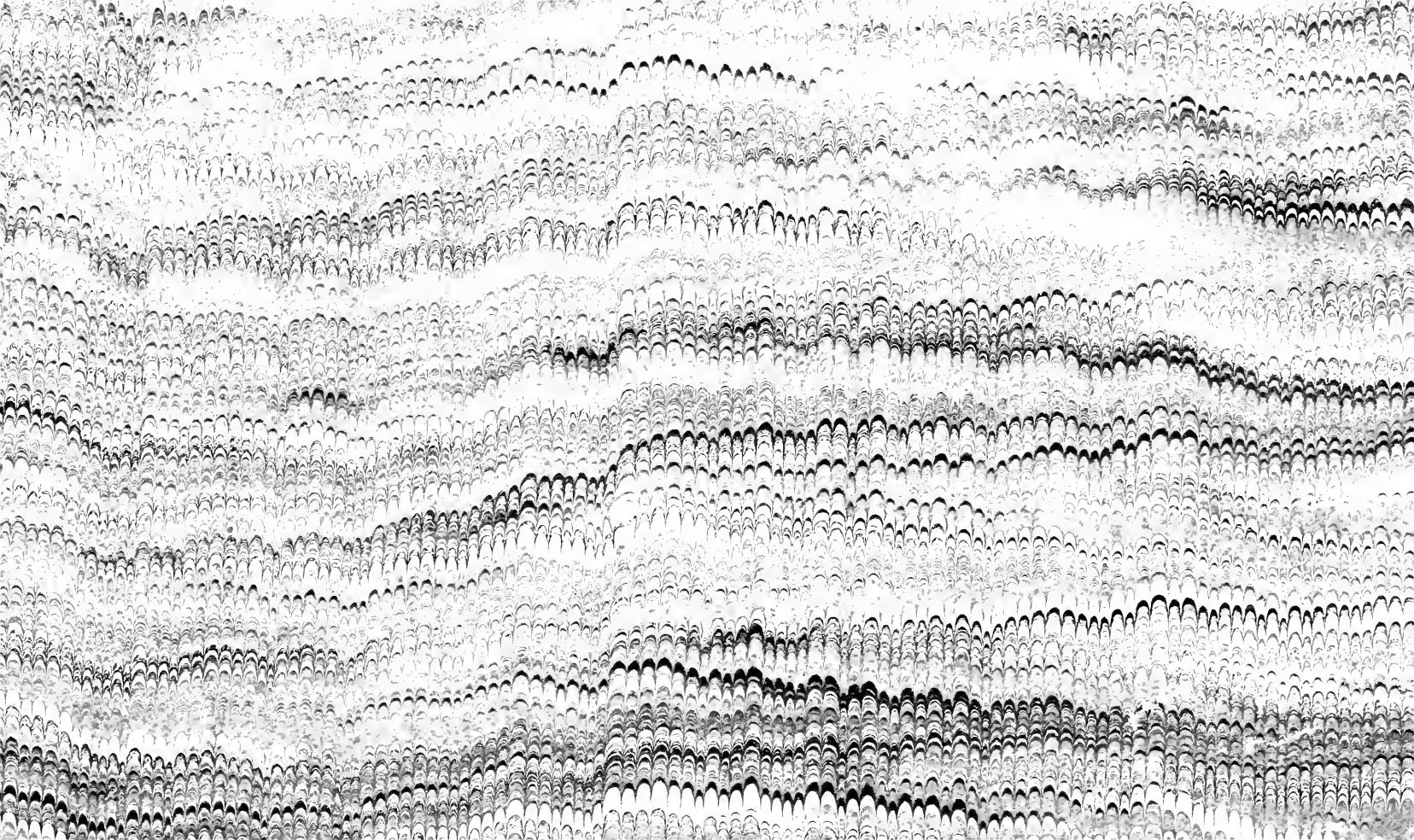

PARIS UNIVERSAL EXPOSITION, 1867.

REPORTS OF THE UNITED STATES COMMISSIONERS.

REPORT

ON THE

PREPARATION OF FOOD,

BY

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PREPARATION OF FOOD.

The Great Exhibition of 1867 contributes certain facts to our stock of knowledge on the preparation of food which are well worth the attention of the public. It is not certain that in the modifications we will have to observe much improvement has been made in a hygienic point of view; we are inclined to believe, in fact, that they are rather gustatory than hygienic—rather for the palate than for assimilation and the creation of healthy blood. But they are nevertheless advances on old systems of preparation, and therefore demand a notice at our hands. Whatever is new, and especially whatever is likely to differ from modes of preparation in the United States, will naturally occupy the largest space in these observations.

CAFÉ RESTAURANTS.

The Imperial Commission certainly had a happy thought in introducing café restaurants as an element of international competition. The realization has not in fact corresponded to the anticipations of the commission, for criticisms have not ceased to fall upon the project from the beginning to the end. The idea of giving the largest and most prominent place to the eating-houses was the first and most prominent point of attack, and one could not, indeed, at the first sight of an arrangement which spreads the kitchen out over the extended circumference, and hides the fine arts away in the contracted centre, refrain from an expression of astonishment at the plan of a temple of civilization which presents the stomach before the head. But the Imperial Commission comprehended better than their critics how much importance the majority of mankind give to the material necessities of life, and it is thus that we find the kitchen in this great international tournament in the place of honor.

It may be said in a general way in regard to competitive cooking, that whatever is common to all is pretty sure to be good, and that whatever is peculiar is pretty sure to be bad. If it shows us nothing else, the outer circle of the Exhibition at least shows us how badly some people live, and this is not without its value. But climacteric influences require, or at least lead into peculiar modes of preparing food, and it does not at all follow that these peculiarities may not be sometimes adopted with advantage by others. The human system is the most amiable of divine creations, and accommodates itself by the force of habit to things the most opposite. The Esquimaux are pushed to the eating of blubber by the necessity for a large combustion of carbon in their

bodies; but a man living under the tropics may also drink and thrive upon cod-liver oil, and perhaps even upon blubber. So, too, we see at the garden of acclimation of Paris the animals of the most opposite climes, by care and by force of habit, made to live and to thrive together.

It is nevertheless to be regretted that the café restaurants, although so admirably placed for the purpose, did not attempt to enter into an international competition, and that they did not reclaim nor obtain even an honorable mention. By aid of the monopoly granted they appear to have entered into no other competition than that of high prices; they perfected nothing but the art of selling dear their mediocre merchandise. After all it was not perhaps the fault of the proprietors; their rent was high, and they were obliged to make money. Yet we expected and should have been treated to a series of grand competitive feasts, in which our palates should have been called to sit in judgment upon all the rarities of these modern times—upon all the latest caprices of the gourmand. We had anticipated being called upon to taste horse, dog, and bear, swallows' nests, sharks' fins, fish-worms, grasshoppers, and sea-lions.

When we come to specify, we find that the American restaurant of Messrs. Dows and Guild was in no sense a success, nationally, in its eating department, and so far as it was a financial operation would have been better left at home. But the ice-cream sodas of this establishment were one of the successes of the Exhibition, and will remain behind. Mr. Dows has taken out patents for the shaved ice employed in the manufacture of these delicious beverages, and there is already a certainty that they are to obtain a wide extension in Europe.

The English restaurant of Messrs. Spears and Pond appears to have been the best financial success of any, and when asked upon what feature of their enterprise they based this success, they replied that they hardly knew, unless it was to the fact that they published their prices and stuck to them. They nevertheless did a large business in "lunches," and they sold enormously of English ale and sherry wine. Their hams and liquors were brought from England; but their beef, mutton, and poultry were French, and they found them quite good enough for an English table, when properly cooked. I am inclined myself to attribute their exceptional success largely to the simplicity and general excellence of the English kitchen, which is thus suited to the digestion of travellers timid about their health.

The French restaurants are said to have lost money. They were organized like similar establishments in the city, and did not claim to present anything new to the public.

The Russian restaurant was successful financially, and made itself a name with its exotic food. It became famous for its *caviar*, its tea, its smoked salmon, its high prices, and the national costume of its waiters.

Of all the other national restaurants of the Exhibition, the omnibus eating-house for the poor, noted only for its economy, and the Viennese and Munich café breweries, appear to have done well.

THE BAKERIES AND THEIR BREAD.

I come now to speak of something of more importance. The Austrian flours, the mechanical bakery of Messrs. Vaury & Plouin, of Paris, and the Viennese bakery of Mr. Vanner, have made a veritable sensation at the Exhibition, and mark a real progress in the manufacture of bread. The flours of Austria, and the mechanical bakery, were rewarded with gold medals; the bakery of Mr. Vanner received only a silver medal. The crowds that constantly assailed these two bakeries showed the importance that was attached to them. No two competitive systems could have been more fairly placed before the public, or with results more positive.

The building erected by Messrs. Vaury & Plouin, of Paris, in the Park of the Exhibition, is 50 by 30 feet, and two stories high. The cost of the building, machinery, and installation was about $15,000. The loss to the proprietors, on account of the short duration of the Exhibition, will be considerable. The establishment requires thirty employés. It contains a granary, a fanning-mill, a grist-mill, several mechanical kneading machines, a machine for cutting the dough into the various formed rolls and cakes, five baking ovens, and the engine that puts the whole in motion.

There is nothing peculiar in the engine; any engine may be employed that is sufficiently powerful to propel the machinery.

The grist-mill possesses no new features; it is simply as perfect a mill as can be constructed, and turns out a very superior flour.

The dough-kneading machines are several in number and of various forms, but all have been discarded but one, M. Vaury informs me, the superiority of which has been established in great part by the present enterprise. The discarded machines are mostly oblong, like troughs, with the kneading wheel turning through their whole length.

The kneading apparatus definitively adopted as the best by M. Vaury, and which appears to be adopted generally with but little modification, may be described as a large, flat, iron kettle, two feet in depth, six feet in diameter, and perfectly circular, the middle so filled up with the box through which the turning shaft moves as to leave a circular trough for the kneading process only about sixteen inches wide. In this trough the two wheels turn which are to knead the dough, affixed at opposite ends of a horizontal shaft, like the wheels of a steamboat. These wheels are open, elliptical pieces of wrought metal, with points bent upwards to catch the dough. Half way between them on one side there is a horizontal wheel with upright paddles, which performs the duty of constantly pushing the dough back to the kneading wheels. With these open kneading wheels the dough is rapidly turned and returned until fit for baking. A mass of several hundred pounds of dough was thus sufficiently worked in my presence in seven minutes.

The machine for cutting the dough into cakes is a cylinder covered with forms in zinc, which forms, in passing under the gallery of a hopper filled with dough, catch the dough, give it their shape, and then

throw it out on receiving boards. It does its work with such rapidity as to be required only at long intervals through the day.

Thirty thousand rolls and crescents are sometimes kneaded, cut, and baked, in the establishment of Messrs. Vaury & Plouin in one day. The capability of the ovens for baking is entirely out of proportion to the capabilities of the various machines for preparing the dough; but the capacity of the ovens cannot be increased without a too serious increase of expense.

The construction of the ovens is of primary importance; several innovations have lately been made, of which the most recent and most remarkable is the introduction of steam into the oven while baking. The ovens of this and all good modern bakeries are made on an inclined plane, with the floor running up from the mouth at as sharp an ascent as the dexterity of the workmen in placing the loaves will permit. The ovens of Messrs. Vaury & Plouin have an inclination of about eight degrees. This ascent favors the establishment of a current of heat, which is better than stationary heat, and it also promotes the circulation of the steam, which is now universally introduced into ovens, near the mouth, while the baking is going on—an improvement which adds materially to the beauty and quality of the bread. In fine, to finish the description of the ovens, their mouths are placed low down so as to prevent the escape of steam or heat, and their domes are made in a flat arch as heretofore. Such is the description of the mechanical part of the much admired establishment of Messrs. Vaury & Plouin.

As for the composition of the dough, it is not pretended that there is any material improvement; it is simply a question of good flour, good yeast, good milk, good butter, and good workmanship.[1]

[1] The following is the formula of a very superior baker as written out by himself: "I employ any first quality of flour: first quality of milk; new Schiedam (Holland) yeast, without mixture. To 200 pounds of flour I put 60 quarts of milk, (75 litres of milk to 100 kilograms of flour.) I then mix about three-fourths of the flour with the milk very lightly. I beat this well until it contains large bubbles of air. I then add the yeast, (about seven quarts soaked in the 100.) I afterwards work in insensibly the rest of the flour, and when the dough is well out of the flour, *I beat it constantly on itself*, until finished, taking great care that it does not get warm. I then take it out of the trough to weigh it. The weigher must be a quick operator, as also the turner. Two masses are weighed at a time, and the turner divides them again in two with the under side of the palm of the hand, the thumb being held close. The pieces are then placed in the moulds, which ought to be well powdered with saxogene or *bouquette*, (flour.) One is turned in each hand. They are then placed in a cupboard or on a shelf in proximity to the oven, in a temperature more elevated than that of the dough, and covered with linen. They are here left to the operation of fermentation, but not too long. When the process of fermentation, which varies in time, has gone on long enough, they are placed in the oven to bake. They are first powdered on the bottom with saxogene. They are then put into the furnace, (which is seven inches high,) one at a time, commencing below and going up till the furnace is full. They are allowed to cook if the oven is very hot 20 to 25 minutes.

"In making the dough the milk is heated in proportion to the temperature of the flour.

"The yeast is simply a compressed and dried composition made from the distillation residues of juniper berries, or chiedam.

"I do not speak of the oven in detail because it is adapted to the kind of baking required."

Mr. Vanner, proprietor of the Austrian bakery, prefers his work done by hand. His bread is adjudged to be the best of the Exhibition, and the majority of travellers speak of the Vienna bread as incomparably superior to all others. I was naturally anxious in the beginning of my investigations to know Mr. Vanner's secret, but I soon found that he had no secret at all. He declares that the superiority of his bread is due to superiority of flour and of materials, and to careful methods of manufacture. He believes, and this point is conceded, although French manufacturers of flour were rewarded with the same medal, that the Austrian and Hungarian flour is the best flour in the world, and *contributes the most important part* to the excellence of his bread. He uses, it is true, the yeast of Fanta, of Vienna, and believes it to be the best; but whether best or not, it requires more watching and more care than the Holland yeast. Mr. Vanner's oven resembles the improved oven of the French mechanical bakery of Messrs. Vaury & Plouin, only that the floor has more inclination. He introduces steam into the oven while baking, the same as the French, so that all his bread is cooked in a thick atmosphere of vapor. Mr. Vanner arrives at his magnificent results, therefore, by the superiority of his material, and by a careful and laborious and intelligent manipulation of them. His secret goes no further than this.

If we turn back now to the mechanical bakery, and make a comparison between the two systems—between the laborious hand system of Mr. Vanner and the majority of the bakers of Paris, and the rapid mechanical system of Messrs. Vaury & Plouin—we find:

1. That the machine-manufactured bread is inferior to the hand-worked Vienna bread, and also to the hand-worked bread of the majority of French bakers.

2. That, on the other hand, while the hand-working system is costly in the great consumption of time, the machine-worked bread is cheap.

3. That the bread worked by hand is subject to inequalities in excellence, on account of the more or less want of attention of the workmen; whereas in the machine-worked bread these inequalities may never exist.

4. That, therefore, both systems are good—the one for *pains de luxe*, or fine bread; the other for good, ordinary bread, and for cheapness, for promptitude, and great rapidity.

I should add that the general sentiment of the bakers in regard to the mechanical bakery is that it is susceptible of a higher perfection than that yet attained; that it is destined to universal adoption; and that, although hand-worked bread may still continue to be made for those who prefer it and can afford to buy it, the machine-made bread is already sufficiently perfect for ordinary uses, and ought to be encouraged.

On the subject of yeast I have only to state that the bakers of Paris use exclusively that made in Holland, of which large depots are to be found at Paris, whereas the Austrian bakers use the yeast of M. Fanta, of Vienna. The reputation of the Vienna bread has become so universal,

and the desire to imitate it so great, that the Vienna yeast has been put on sale at Paris, and comparative experiments between it and the Holland yeast are now being made by the Paris bakers.

After saying this much of the comparative modes of baking, and of the ameliorations which have been introduced into this important industry, I am compelled to state that in the opinion of the medical world this very fine flour and fine bread are not favorable to digestion and assimilation; in other words, that although there is an evident progress in a mechanical point of view, there is none or worse than none in a hygienic point of view; and that if we look at the question in this more practical light, our enthusiasm for the inventors must be singularly moderated. We see in effect that birds swallow whole grains of corn, and then follow them with pebble stones to grind them; and digestion is too similar a process in all bodies to be ever exactly opposite. Every one in effect knows the benefit derived in cases of weak digestion from whole mustard seeds and from bread made from unbolted flour. The infinitesimal division of the flour and its perfect bolting, which constitute the secret of excellence in the Austrian flours, create acidity of stomach and tend to indigestion. The improvement, therefore, which I have noted is, as mentioned in the first part of this report, gustatory rather than hygienic, and must be passed rather to the account of art and luxury than to that of utility.

In France dyspepsia is extremely rare; in America every second man is more or less dyspeptic. The causes of this frequency are: miasmatic influences, (which derange the liver,) bad cooking, hasty eating, hot bread, the abuse of liquors, and the excessive use of liquids. In France there is no miasmatic influence to derange the liver, the cooking in general is good, no one eats hastily, hot bread is regarded as a poison, no one abuses strong liquors, and but little water is ever drunk. To these happy aids to digestion in France ought to be added the benign influence of the common table wine of the country, the wine which contains not more than from 8 to 12 per centum of alcohol. This kind of wine is certainly strongly tonic, and, according to the opinion of Frenchmen, its regular and regulated use renders men more vigorous, more intelligent, more sociable, and more sober. The curse of drunkenness is only observed in the geographical zones and the social strata where wine is only drunk by exception. The man who is able to find on his table every day at dinner and supper half a bottle of red wine has no need of going to the tavern or the drinking saloon. But these remarks apply only to the red wines of France, to the wines of daily use, the wine which sustains while quenching thirst, the wine which is, in fine, the real comrade of bread. The wines of Spain and Portugal intoxicate and brutalize, but neither quench the thirst nor satisfy any reasonable desire of the body; the wines of western Germany create acidity and thirst, and are, therefore, in no sense hygienic. It is only the red wine of France which is both moral and logical, and fit for the daily use of every man.

The system of bread-baking and bread-eating in France reposes on the idea that bread should be eaten in from four to twenty-four hours after baking. It should be cold, and good enough to be eaten even by invalids before it is stale. No bread is made in the family kitchen, and there is no such thing as hot short cakes, hot corn bread, and hot buckwheat cakes. It is always the same monotonous, but excellent, cold roll, or *flute*, from year's end to year's end. It is a fundamental article of faith that bread, to be wholesome, must contain as much outside, or crust, as possible, and for this reason we see no "family loaves," as in England and America; nothing but the eternal single loaf, suggestive of economy, and of that life of individual isolation which forms such a desolate feature in the every-day history of Paris.

FARINACEOUS PREPARATIONS.

The flour of Austria took the highest rank at the Exhibition. The jury awarded to the French manufacturers a medal of gold, the same as to the manufacturers of Austria; but the bakers and the public did not hesitate a moment in giving their judgment in favor of the Austrian flour. The Austrian system of manufacturing will be introduced at once into France, and will prove a money-making enterprise to whoever will introduce it into the United States; for, however inferior it may be in healthful qualities to the coarser flour, it will yet always command a large sale as an article of luxury. The system of manufacturing as pursued in Austria must, we are told, be seen to be perfectly comprehended, and any one desirous of adopting the system of that country must study it on the ground.

If we consider flour on principle as a question of hygiene, independent of what the public demands, we should say that the best system of grinding was that which *disaggregated* the round and regular molecules of the grain of wheat without *pulverizing* them. Not only is the flour better which is composed of separated instead of crushed particles, but to separate them is the easiest, the most elementary, and the cheapest mode of grinding. *Both science and practice condemn the crushing process*, and yet this process remains the most in use. To the quality of the grain is due, in the first place, much of the quality of the flour. The bakers of the present day prefer flour made from white, tender wheat, because it makes whiter bread, and as this wheat is easier ground than the harder kind of wheat, the miller also prefers it. But the baker loses by it, because this very white flour contains less gluten, and therefore produces less bread. The public also lose by it, because it is less nutritious, less rich in alimentary principles, and more of it must be consumed to produce the necessary amount of nourishment to the body. The fact that the hard grains of wheat are richer in gluten than the white and tender grains is admitted by science and verified by practice. And, so far as France is concerned, this demand of the millers and bakers for the white, tender grain has almost excluded the better grain from

agriculture. So too we hear often in France in these days of the wheat being frozen, an accident scarcely heard of at a period when the harder grain was more in vogue.

Is it not strange to see empiricism invading so serious and so positive a matter as that of the culture of wheat and the manufacture of flour? We have a right to be surprised at seeing fashion and speculation creating habits in this, exactly as in the trifling affairs of life; at seeing agriculture perverted and deteriorated; at seeing the artificial substituted for the natural. The public has thus been taught to prefer a bread made of starch, perhaps even heightened in its whiteness by alum and the sulphate of copper, to a natural and savory and healthy bread, with plenty of gluten and nourishment and life in it, because the latter is not so pleasing to the eye.

The thing to be avoided, therefore, is the system of grinding, which deteriorates the gluten, *the meat of the wheat*, which is thus made to pass off in the form of acetic acid. We must avoid producing a flour simply for the sake of its whiteness and beauty, which, when made into bread, is tasteless, laxative, and brittle, and which dries up in a few hours to a crust. We must avoid a system of grinding which requires, in order to attain the necessary attenuation of the flour, that the stones should almost touch, thus heating the flour and even requiring that it should be wet. We must avoid this system of excessive fineness because it is both costly and useless.

I should say finally that what we want is: 1. A hard and hardy glutinous grain like that of Hungary; 2. A system of grinding which leaves the round granules of the grain of wheat separated but not crushed; 3. The Vienna system of baking, which unites to superior materials of all kinds an excessive care in all the manipulations of the bakery; 4. The modern oven described above, and which is a great improvement on the ancient oven. I should add that the mechanical bakery will be found indispensable for the rapid and cheap fabrication of ordinary bread.

GLUTEN BREAD.

The gluten bread employed in the hospitals of Paris for diabetic patients is manufactured as follows: Take of gluten flour two pounds; of fresh yeast the size of a filbert, mixed with a little cold water; of kitchen salt two pinches. Mix, and then add of warm water, at 35 to 40 degrees centigrade, a sufficient quantity to make a dough of a proper consistency. Then place the dough for an hour and a-half to two hours in a place warm enough to operate the fermentation, cut it into cakes, roll them in gluten flour, and bake them in the same way as ordinary bread.

MACCARONI.

Italy, Algiers, and France, produce the best specimens of this useful and healthy alimentary preparation. As in bread so it is here; the yellow, highly glutinous varieties, are superior in savor and nutritive

qualities to the white, starch-like varieties. There does not appear to be any particular improvement in the fabrication of the various *pâtes alimentaires;* the improvement is more in the extension of the form than of the substance. One's knowledge of mathematics is put to route by the multiplicity of forms the fabricants of these articles have attained.

These dough preparations, although not an essential article of diet, are yet highly useful, because good and healthy, and because they add another to the list of articles which may be kept safely in store for table use.

Of the other farinaceous preparations the one which has attracted most attention is the American maizena, of Duryea, an article which needs no description here.

CONCENTRATED MEATS.

A certain sensation has been created within late years, I might almost say within the last year, by the various successful experiments in the concentration of meats. We begin to see now what must have been in former times the sufferings of communities, and especially of caravans and of sea-faring people, by the ignorance which prevailed on the modes of preservation of food for long voyages. We can imagine what privations were entailed on a whole community by the ravages of those epizootic diseases which sometimes swept away the entire race of cattle, leaving behind no meat subsistences for the consumption of the people. If we come down to our own day we can recall to mind terrible sufferings which have passed under our own observations from scorbutic affections, caused by the want of fresh food, or of meats preserved otherwise than in salt. Vaccination and mercury and quinine have saved thousands of human lives, and the world is grateful for the discoveries; so too the world is grateful for those discoveries of science which protect the navigators of the present day from the frightful diseases which ravaged the ships of Christopher Columbus and the bold navigators of the early day.

We know now, thanks to the discoveries of science and to the incessant progress of chemistry, that the decomposition of meats and vegetables may be suspended almost indefinitely, that fish as well as game, that peas or asparagus as well as beef or mutton, may be consumed, with pleasure to the palate, several years after being killed or gathered.

The most important of these preserved articles of food is unquestionably the concentrated meats. It is not worth while to discuss here the question of priority in this progress, nor to indicate the various steps gone over before arriving at the present perfection. We have before us at the present Exhibition the most precious and the most remarkable of all the results thus far attained in the *extractum carnis*, the extract of meat, of the distinguished chemist of Munich, Professor Liebig. The history of this industry is well known. In South America, where cattle are killed in masses simply for the hide and tallow, Prof. Liebig sought and found a proper field for the profitable working of his discovery.

By his process the meat is deprived of both its gelatine and its fat. Forty-five pounds of beef is reduced to one pound of extract. Of this extract a teaspoonful will make four bowls of soup. Boiling water and salt are all that are required for the operation. The preparation of Liebig, after many trials, proved itself the strongest in its concentration, and as far as is known is believed to be the most completely inalterable in all climates and under all conditions of exposure. French war vessels have carried it through the tropics without any special care, and without any signs of fermentation.

Quite a number of specimens of concentrated beef were exhibited by other inventors, one of the best of which bore the mark of Borden & Currie, of Illinois. Another superior specimen bore the mark of Whitehead & Co., of Australia. The French and English exhibit many specimens, and this commerce bids fair to assume in a short time very large proportions.

It is incontestible that these concentrated meats are destined to render an immense service. Wherever it is difficult or impossible to obtain fresh meat, as, for example, on long voyages by sea, or in caravans, or in armies on rapid marches, or for the cavalry service, or for hunting parties, this new, compact, simple, and excellent alimentary preparation must come into general use.

As for invalids, especially those laboring under acute disease, these concentrated meats can never take the place of the ordinary beef soup and beef tea, because neither their flavor nor their taste are so tempting to the week and nauseated stomach. A very sick man will always be found to prefer the old-fashioned beef tea, if well made, to the soup made from Liebig's, or any other form of extract of meat which has yet been offered for public appreciation.

The alimentary department of the Exhibition is rich in products of all kinds preserved by reduction in a vacuum, or by desiccation and compression, for a prolonged use. These processes apply alike to meats and vegetables, and are so well understood and so generally adopted as to require no particular description in this place.

Those articles which have attracted the most attention are the concentrated meats to which I have just referred, and a specimen of preserved flour, seven years old. The value of this last discovery cannot be overrated, for by it many a famine may be averted. The nutritive value of a flour is estimated ordinarily by the proportion of gluten it contains. Good flour contains 30 per cent. of humid gluten. The preservation of the flour consists, therefore, in converting these 30 hundredths of humid gluten (which is a highly fermentible matter) into 10 hundredths of dry gluten, which, later on, when desired for use, recovers, by being wet, all its primitive elasticity. The flour must be desiccated without being altered, and care must be taken afterwards to protect the disengaged particles of starch from the influence of heat and humidity. The grand problem of the preservation of flour is thus resolved, and the honor of it belongs to M. Touaillon, a large manufacturer of flour near Paris.

M. Gentil, of Mans, in France, claims and is awarded the honor of a new method of cooking fish for preservation. He applies hot air and the metallic bath to the boiling of the oils employed by the manufacturers of preserved aliments, and for the cooking of fish of all kinds. That is to say, the direct and unequal action of the combustible is replaced in this system by hot air, obtained indirectly from the heat of the furnace. There is an economy of oil, the fish thus preserved are whiter, more tender, and of a more regular color than those prepared by the other processes. The progress is claimed as an important one for those engaged in this commerce.

The *Pâté de Foie Gras* is represented at the Exhibition by some of the finest specimens of Strasburg manufacture. This other caprice of the fashionable world is the product of the artificial fattening of the goose. The goose is stuffed to repletion with food for several weeks in front of a fire, and at the end of this time the liver of the animal is found swelled to an enormous size with fat. The liver is then cut up and mixed with fat from the goose, and with truffles and other condiments, and then cooked in a case of dough. Paris consumes annually of this delicious but rich alimentary preparation to the amount of 2,600,000 francs. It comes into market mostly from Strasburg, but is also manufactured at Bordeaux, at Agen, at Perigueux, and even at Paris. We cannot admit that a hypertrophied liver, artificially produced, is a healthy animal product, and we do not believe that the manufacture of *pâté de foie gras* is a commerce to be commended in this place.

TRUFFLES AND MUSHROOMS.

Some specimens of preserved truffles are also exhibited which appear as high flavored and as delicate as the fresh ones just brought into market. Truffles, as the reader perhaps knows, are a fungous growth, the result of the sting of microscopic insects upon the roots of a certain kind of oak tree, in a certain clayey soil, and in a certain district of country. The insect stings the oak root to deposit its eggs, and the fungous growth called truffle is supposed to proceed from a blasted egg. This precious tubercle, the last caprice of the gourmand, is not, therefore, susceptible of cultivation, and all attempts at transplantation have failed. Nearly the whole commerce of the world is supplied from the department of Perigord, in France, but truffles are also found in abundance in certain parts of Africa, and have been found in limited quantities in other parts of the world. Whole trees, with roots, and soil, and growing truffles, have been transplanted to other localities in appearance equally favorable to their growth, but all these attempts at propagation have failed. A successful mode of preservation was, therefore, a desideratum, and for this the epicureans of all countries will be grateful.

Mushrooms are also on exhibition preserved by the same system; but mushrooms are more universal in their growth, and may even be cultivated, as we see by a demonstration in the reserved garden of the Exhibition.

A little mound of manure and alluvial soil, arranged in a particular way, is made to grow mushrooms at will.

COFFEE.

France has a special reputation for the preparation of coffee for the table. It is therefore important that I should refer to the subject in this report.

The grain used in this country comes for the most part from Brazil. The best specimens probably come from Arabia and Egypt, but only in small quantities, and the world hereafter will undoubtedly be supplied for the most part from Brazil. The grains from these three countries are well represented at the Exhibition.

Coffee is prepared in France for the table by a system of distillation in a small quantity of water which is now understood and adopted more or less in all civilized countries. It is adulterated often with chiccory, acorns, gray peas, carbonized beets, roasted rye and barley, and other substances. Economy, of course, is at the bottom of these adulterations, but the pretexts of taste, color, and even of hygiene, are urged with earnestness as an excuse.

But coffee ought to be, and is, drunk alone by those who understand its real hygienic effects. Its use is regarded by those who have well observed these effects as positively conducive to the prolongation of human life. It acts by moderating the force of the circulation. It blunts the biting action of oxygen on carbon. It calms the movement of organic disassimilation, and thus causes to be used all sorts of old materials which otherwise would be hurried too soon out of the body. The sleeplessness it sometimes produces is not a diseased or pathological condition, but rather the establishment of an absolute equilibrium, which reposes the various organs of the body as much as if the eyes were closed in sleep. Its action is not to be assimilated to that of medicinal anodynes, which also retard the circulation and the elimination of elementary particles, for these are followed by an astringency, a nausea, and a collapse, which constitute a pathological condition, and they are, therefore, opposed to health. The great secret of the prolongation of human life is the establishment by healthy means of an equilibrium in the functions of the body, and it is certain that coffee does contribute in a healthy way to this end. It cannot be used in all climates to the same advantage, nor by all persons, nor in indifferent quantities. A careful observation should preside always at its use if we wish to obtain its best effects on health.

CHOCOLATE.

Chocolate is a favorite beverage in France, and the various preparations of this article are well represented, especially in the French section. It is a valuable elementary preparation, worthy of a wider use than it has obtained, but unfortunately subject to the vilest adulterations per-

haps of any other article of table use. The adulterations most frequently are: cocoa exhausted of its butter, colored fecula, oils, and grains. The genuine chocolate of the best fabricants is made about as follows, taking 1,000 as the total figure:

Sugar	485 parts.
West India cocoa	500 "
Vanilla	9 "
Cinnamon	6 "
Total	1,000 "

Good chocolate is sold at Paris at four and five francs the pound. All chocolate sold under these prices is certain to be adulterated. The high price of the genuine article, the facility for frauds, and the well-known fact that these frauds are practiced on a larger scale, are circumstances which operate powerfully in limiting the use of what might become with good reason an aliment of much more general use.

The best specimens of chocolate at the Exhibition are those of M. Menier, the first manufacturing chemist of Paris, and of M. Devinck, the oldest and largest manufacturer of chocolate in France.

SUGAR.

Little is to be said on the subject of sugar if it be not that this precious alimentary product is represented in almost every nationality of the Exhibition, and that each manufacturer is astonished at the perfection of the other. No one product perhaps is so generally and so well represented. The cause of this is, that everything about sugar is positive. For example, there are but two substances from which sugar can be extracted with advantage to the manufacturer, and these are the beet root and sugar cane. These two raw materials defy all competition. Then, again, the modes of manufacture are well understood in all countries; so that it is not surprising that we see such excellent specimens of sugar from countries even where other branches of manufacture have thus far acquired but little extension. The manufacture of this article has reached, especially in the workshops of France, and with the beet root, the last degree of perfection. The rendering of sugar has been carried from 5 to 8½ per cent. of the raw material. There is therefore no further improvement to be sought after; the maximum of extraction with the minimum of expense has been attained.

PROFESSOR LIEBIG'S ARTIFICIAL MILK FOR CHILDREN.

This new important compound, invented by the learned German chemist, is not on exhibition only because it does not preserve well. It has nevertheless been discussed on the outside as one of the new ideas which takes its place in the grand competition of the Champ de Mars, and therefore naturally forms a part of this report. In this compound

Professor Liebig pretends to have found a chemical substitute for mother's milk; his analytical mind and his profound knowledge of chemistry are in some sort a guarantee of its perfection.

But most persons will call to mind the discussion provoked by this imitated milk in the learned academies of Paris, and the condemnations that were there passed upon it. The weighty name of Liebig and the natural desire of men of science to add a new element of life and comfort to those already known, were powerful stimulants toward an unreserved acceptation of the new compound. The astounding developments of mortality among children in France, lately made to the Academy of Medicine of Paris, a mortality which reached the frightful figure of 90 per cent. in certain communes, made men turn their eyes eagerly in every direction for new aids in arresting the destruction. So that in this apparently insignificant question of infantile food we see a grave question of humanity and of political economy, for the increase or decrease of population is a consideration of a primary importance to both statesmen and philanthropists. As communities grow older and become more compact the number of children to be fed by hand increases, and the necessity of new modes of nutrition becomes more apparent.

Of what does Professor Liebig's famous substitute for human milk consist? The following is his process: A half an ounce of wheat flour is boiled with five ounces of skimmed milk until the mixture is transformed into a homogeneous mass; it is then taken from the fire and to it is added immediately half an ounce of cross-spired barley, which must have been first ground in a coffee mill and mixed with an ounce of cold water and a drachm of a solution of bi-carbonate of potash, the latter in turn made with eleven parts of water to two of the potash. After having added the barley the vessel is placed in warm water or in a warm place till the mixture has lost its consisteney and has become liquid like cream. It is allowed to repose for fifteen or twenty minutes and is then replaced on the fire and made to boil for a few seconds, when it is removed and poured through a strainer of hair or thread, so as to eliminate the fibrous parts of the barley. Before giving the milk to the child it is allowed to settle in order that all the fine fibres of the barley that may remain in suspension may be precipitated.

The artificial milk thus prepared contains, according to Professor Liebig, the plastic and respiratory elements essential to respiration and the nutrition of the body in about the proportion of from 10 to 38 on the 100; and this, still according to Professor Liebig, is the same as human milk. The French professors do not find this statement correct, especially as regards the quantity of life-giving principles in human milk, and think that M. Liebig took his milk for experimentation from a woman in a low state of health. They think that normal human milk contains more than from 10 to 38 per cent. of the essential elements of reparation, and that, admitting M. Liebig's idea to be a good one, his compound is still unequal in force to the fluid it is intended to replace.

This artificial milk has already acquired a considerable extension in Germany, England, and other countries, and in many localities it is the food furnished by charitable societies to the children of poor mothers, to such as are either obliged to abandon their children or to place them in the nursing establishments by the day. No official reports on the success of this new system of alimentation have yet come to my knowledge; nevertheless, here in France the milk has been tried by Dr. Depaul, professor at the School of Medicine of Paris, on four children of the Foundling hospital, and they all four died, two in two days, one in three days, and one in four days, and all alike with bilious evacuations.

I do not pretend to know whether M. Depaul's experiments were faithfully made or not; M. Liebig says they were not. But certainly no man is more competent than Professor Depaul to make such an experiment, and there is no reason for doubting his good faith. This fatal experiment, however, has been sufficient to destroy the confidence of men of science in France in this new article of food, and it is probable that it will acquire no great extension in this country.

In France people are satisfied in this emergency with cow's milk. *The milk of the cow, with the addition of one-fifth of water and a little sugar, is not only a nearer approximation to human milk, it is the nearest approximation of all.* Why then fly to a doubtful chemical composition, when we have at hand so natural and safe an aliment as diluted and sweetened cow's milk?

Liebig's much vaunted artificial milk must therefore take rank after human milk and after properly diluted animal milk. But like the same professor's concentrated beef, which is highly useful where the natural beef is not to be obtained, so, too, this chemical milk may be useful in the absence of natural human or animal milk.

We do not, however, hesitate to give it rank before the numerous class of farinaceous preparations, which are increasing every day. The chemical composition of wheat flour is such, in fact, that it is not difficult to understand its injurious effects on infantile life. It possesses an acid reaction, and after incineration leaves phosphatic acids, which do not furnish in the process of digestion the quantity of alkali necessary for the formation of blood.